

POES IJPS

Polar-orbiting Operational Environmental Satellite (POES)

Initial Joint Polar-orbiting Operational Satellite System (IJPS) System Requirements for the Ingest and Preprocessing System (IPS)

September 2002



Prepared by:

**U.S. Department of Commerce
National Oceanic and Atmospheric Administration (NOAA)
National Environmental Satellite, Data, and Information Service (NESDIS)**

NOAA/NESDIS

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Approval Page

Document Numbers:

NOAA/NESDIS
POES Series

NOAA-POES-IJPS/OSD-2002-0009R0UD0
September 20, 2002
DCN 0

Document Title Block:

Polar-orbiting Operational Environmental Satellite (POES)

IJPS System Requirements for the Ingest and Preprocessing

System (IPS)

PROGRAM: POES IJPS

DOCUMENT RELEASE DATE: September 20, 2002

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Document Change Notice

DCN NO.: 0	DATE: September 20, 2002	PROGRAM : SYSTEM: POES : IJPS	PAGE NO.: 1 of 1
DOCUMENT TITLE: <i>Polar-orbiting Operational Environmental Satellite (POES) IJPS System Requirements for the Ingest and Preprocessing System (IPS)</i>			
DOCUMENT NO. NOAA-POES-IJPS/OSD-2002-0009R0UD0			
CHANGE PAGE HISTORY			
No.	Page Number(s)	Update Instructions (Insert / Delete / Replace)*	Reason for Change
0	Complete Document	Original baseline version of this document	As presented at the NOAA SRR and updated to reflect all Review Item Discrepancies from the SRR Review Board.
COMMENTS: This is the first publication of this document; as such, it comprises the DCN 0 baseline.			
NOTES:			
*EXAMPLES: An Insert change pages 6.2-6 through 6.2-9 following page 6.2-5 A Replace pages 3.4-1 through 3.4-10 with change pages 3.4-1 through 3.4-10b A Replace page 4.5-24 with change page 4.5-24; delete pages 4.5-25 through 4.5-30			

Version Description Record

DOCUMENT TITLE:

Polar-orbiting Operational Environmental Satellite (POES) IJPS System Requirements for the Ingest and Preprocessing System (IPS)

DOCUMENT NUMBER:

Baseline: NOAA-POES-IJPS/OSD-2002-0009R0UD0

SYSTEM:

POES IJPS

DOCUMENT BASELINE ISSUE DATE:

September 20, 2002

DOCUMENT CHANGE HISTORY

DCN No.	Revision/Update Nos.	Date	DCN No.	Revision/Update Nos.	Date
0	R0UD0	September 20, 2002			

NOTES:

Preface

This document comprises the NOAA/NESDIS baseline publication of the Polar-orbiting Operational Environmental Satellite (POES) IJPS System Requirements for the Ingest and Preprocessing System (IPS). This document is Revision 0, DCN 0 (document number NOAA-POES/OSD-2001-0009ROUDO).

This document identifies requirements for the NOAA Ingest and Preprocessing System (IPS) system for IJPS. The intent is to provide a baseline for future upgrades needed to perform IJPS satellite related functions required to sustain the joint NOAA/ European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) system called the Initial Joint Polar-orbiting Operational Satellite System (IJPS).

The initial version of the document was prepared by Computer Sciences Corporation (CSC) on the Central Satellite Data Processing (CSDP) contract (Contract Number: 50-SANE-6-00028).

Publication of this document closes Document Configuration Change Request (DocCCR) # DocCCR-POES-Other-2002-003, entitled Acceptance of POES System Requirements for Initial Joint Polar-orbiting Operational Satellite System (IJPS).

Future updates and revisions to this document will be produced and controlled by NOAA/NESDIS/OSD.

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Acronyms and Abbreviations

A-DCS	Advanced DCS
AAS	Data Archive and Access System
AD	Applicable Document
AIP	AMSU Instrument Processor
AMSU-A	Advanced Microwave Sounding Unit - A
ASCAT	Advanced Scatterometer
ATN	Advanced TIROS – N
AVHRR	Advanced Very High Resolution Radiometer
CCSDS	Consultative Committee for Space Data Systems
CDA	Command and Data Acquisition (Station)
CSC	Computer Sciences Corporation
CSDP	Central Satellite Data Processing
DCS	Data Collection and Location System
EPS	EUMETSAT Polar System
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
FRAC	Full Resolution Area Coverage
GAC	Global Area Coverage
GDB	Global Database
GDS	Global Data Set
GFT	Generic File Transfer
GOME	Global Ozone Monitoring Experiment
GRAS	Global navigation satellite system Receiver for Atmospheric Sounding
HIRS	High-Resolution Infrared Radiation Sounder
IASI	Infrared Atmospheric Sounding Interferometer
IJPS	Initial Joint Polar-orbiting Operational Satellite System
IPD	Information Processing Division
IPS	Ingest and Preprocessing System
Metop	Meteorological Operational Satellite
MHRPT	Metop High Resolution Picture Transmission
MHS	Microwave Humidity Sounder
MVS	Multiple Virtual Storage
NASA	National Aeronautics and Space Administration
NESDIS	National Environmental Satellite, Data, and Information Service

NOAA	National Oceanic and Atmospheric Administration
OSDPD	Office of Satellite Data Processing and Distribution
PGD	Product Generation and Distribution
POES	Polar-orbiting Operational Environmental Satellite
RD	Reference Document
SAIP	Stored AIP
SAR	Search and Rescue
SARR	Search and Rescue Repeater
SEM	Space Environment Monitor
SOCC	Satellite Operations Control Center
SPS	Sensor Processing System
STIP	Stored TIP
TCP/IP	Transmission Control Protocol/Internet Protocol
TIP	TIROS Information Processor
TIROS	Television Infrared Observation Satellite
V&V	Verification and Validation
VCDU	Virtual Channel Data Unit
VCID	Virtual Channel Data Unit ID

1.0 Introduction

The National Oceanic and Atmospheric Administration (NOAA) has entered into an agreement with the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) for participation in the Initial Joint Polar-orbiting Operational Satellite System (IJPS) (hereinafter referred to as the "IJPS Agreement.") In the IJPS Agreement, NOAA and EUMETSAT agree to operate their Polar-orbiting satellites in a manner beneficial to both parties and the world's meteorological community.

The IJPS is comprised of two independent, but fully coordinated, polar satellite systems. Each independent system is comprised of two satellites flown consecutively under control of its respective ground segment. In support of the IJPS, NOAA satellites NOAA-N and -N' will be flown consecutively (N' replaces N) in a polar orbit with an afternoon equatorial crossing time. EUMETSAT, working together with the European Space Agency (ESA), will develop the Meteorological Operational (Metop) series of satellites to be flown consecutively in a Polar orbit with a mid-morning equatorial crossing time. The Metop satellites comprise the space segment of the EUMETSAT Polar System (EPS). The mid-morning and afternoon satellites will have a set of jointly provided common instruments, plus additional instruments specific to each orbit, provided by NOAA and EUMETSAT for their satellites. The IJPS Agreement also commits NOAA and EUMETSAT to supporting each other's operational satellite through their respective ground segments for commanding, receiving telemetry and global data, monitoring their respective satellite on-orbit status, and exchanging data between the two polar satellite systems.

NOAA's national and international commitments for providing global environmental data are the responsibility of the National Environmental Satellite, Data, and Information Service (NESDIS). NESDIS is responsible for establishing and operating civil operational environmental satellite systems while acquiring replacement satellites, launch vehicles and launch services through interagency agreements with the National Aeronautics and Space Administration (NASA).

The Office of Satellite Data Processing and Distribution (OSDPD), Information Processing Division (IPD) is responsible for ingesting and preprocessing data from both the morning and afternoon satellites, now and throughout the IJPS era.

1.1 Purpose

The purpose of this document is to identify the high level IPS system requirements for IJPS. These requirements also serve as the primary focal point for the traceability of all lower level requirements in IPS. This document contains high-level system requirements that are specified in or derived from the Polar-orbiting Operational Environmental Satellite Systems Requirements for the Initial Joint Polar-orbiting Operational Satellite System (IJPS), RDN-4 (AD-1). The IJPS management group in the NESDIS Office of Systems Development (OSD) maintains RDN-4.

1.2 Scope

The scope of the changes that need to be made to the existing IPS POES support activities is directed more toward the morning mission than the afternoon mission. The only change to the IPS afternoon support, for NOAA-N and N', is the blind orbit data, which will be processed in pipeline mode (defined below). The orbital data will still be received from the NOAA Command and Data Acquisition (CDA) stations, as is done in the current KLM era. However, for IPS to support the morning mission many changes/updates are needed. This document identifies the IJPS System Requirements that require a change, or update, to the current POES support in IPD.

IPD management has approved the requirements identified in this document. These requirements form the basis for all of the work that will be performed within IPS to support the IJPS mission requirements.

1.3 Document Organization

- Section 1.4 – lists the applicable documentation that provides source information to the scope of requirements on the POES system.
- Section 1.5 – lists the reference documentation that provides additional information to the scope of requirements on the POES system.
- Section 2 – provides the IPD mission statement.
- Section 3 – provides the formal requirement statements.
- Section 4 – provides definitions to keywords that are used. The keywords are used throughout the document for brevity.
- Section 5 – provides explanations for open issues.

1.4 Applicable Documents

Table 1-1 presents a list of Applicable Documents (AD-#) that contain information and/or requirements that need to be applied for the successful completion of the IJPS program.

Table 1-1. Applicable Documents

Doc #	Title	Reference Number	Issue	Date
AD-1	Polar-orbiting Operational Environmental Satellite Systems Requirements for the Initial Joint Polar-orbiting Operational Satellite System (IJPS), RDN-4	NOAA-POES-IJPS/OSD-2001-0004R0U0	DCN0	30 Aug 2002

1.5 Reference Documents

Table 1-2 presents a list of Reference Documents (RD-#) that provide additional useful information for program implementation.

Table 1-2. Reference Documents

<i>Doc #</i>	<i>Title</i>	<i>Reference Number</i>	<i>Issue</i>	<i>Date</i>
RD-1	Information Processing Division System Requirements Specification, IPD-SRS	IPD-1012	1	01 Oct 2001
RD-2	IPD Operations Concept Document	IPD-1013	1	12 Mar 2002

2.0 IPD Mission

The Information Processing Division (IPD) is a branch of the Office of Satellite Data Processing and Distribution (OSDPD) of the National Environmental Satellite, Data, and Information Service (NESDIS) under the National Oceanic and Atmospheric Administration (NOAA) responsible for the Central Environmental Satellite Computer System (CEMSCS). CEMSCS consists of distributed hardware and software systems that perform instrument data ingest, data preprocessing, product processing, selected product distribution and near-line storage of selected data sets. IPD currently maintains and operates a Multiple Virtual Storage (MVS) mainframe computer known as the IPD Enterprise Server (IPD/ES) and some Unix platforms in Suitland, Maryland, to process the majority of operational products for the NOAA POES program (RD-2). The current NOAA polar satellite products available through CEMSCS include NOAA Level 1 data bases for each of the on-board instruments and derived Level 2 and 3 products in the areas of atmospheric soundings, sea surface temperatures, radiation budget, atmospheric aerosols, vegetation index, snow and sea ice cover, cloud parameters, precipitation, imagery data, and ozone monitoring.

This document addresses the IJPS System Requirements for only the Ingest and Preprocessing System (IPS) within IPD.

The ingesting of POES Global Area Coverage (GAC) satellite data is currently done in CEMSCS, which receives a frame synchronized raw data stream from the Satellite Operations Control Center (SOCC). The ingestor reconstructs and time-references the unprocessed instrument/payload data at full resolution into Level 1a data sets (see Table 2-1). In the IJPS era, data from NOAA-N, -N' will be ingested similarly as is done currently, however SOCC may be bypassed and the ingestor may need to perform frame synchronization as well. The data from Metop-1, -2 will be a steady stream of Consultative Committee for Space Data Systems (CCSDS) packets received as Virtual Channel Data Unit (VCDUs), so a new ingestor function is needed. (A new front-end processor (FEP) platform to house the new ingestor also needs to be procured.)

Currently the ingestor finishes the 1a data sets then initiates the preprocessor on the IPD/ES computer. The preprocessor appends quality indicators, calibration and earth location then produces full (unpacked) resolution Level 1b* data sets for internal IPD Level 2/3 application use. The unpacked Level 1b* data sets are then packed and reformatted into Level 1b data sets for external users and the Archive and Access System (AAS). (Refer to Table 2-1 for descriptions of these processing levels.) In the IJPS era, the preprocessor function will be similar, except it will be operating in pipeline mode. Full orbital files will still be made for the AAS.

Table 2-1. Processing Level Definitions

Processing Level	NOAA
0	Unprocessed telemetry data as received from the observing platform excluding communications artifacts introduced by the ground system.
1a	Telemetry data that have been extracted but not decommutated from Level 0 and formatted into time-sequenced data sets for easier processing. The Level 1a formats are NOAA's internal formats and are only used for NOAA processing. They only exist briefly for the purpose of creating the Level 1b datasets (and could even be eliminated in the future).
1b	Discrete, instrument-specific data sets derived from Level 1a containing unprocessed data at full resolution, time-referenced, and annotated with ancillary information including data quality indicators, calibration coefficients and georeferencing parameters.
1b*	Uncompressed and unpacked Level 1b data that contains appended earth located, time-tagged instrument counts with calculated calibration parameters for internal use only in product production.
2	Derived geophysical variables at the same resolution and locations as the Level 1 source data.
3	Data products that are variables mapped on uniform space-time grid scales, usually with some completeness and consistency.
4	Data products that are model output or results from analyses of lower level data, e.g. variables derived from multiple measurements.

3.0 IPS Requirements to Support IJPS

Requirements are grouped as follows:

- **Functional** – What the system must do - "a capability."
Note: Any applicable performance requirement to this functional requirement should be found under "Performance" in the same section.
- **Performance** – "How well" the system must do, in quantifiable units.
- **Operational** – "When," "where," "how long," etc. what a system does, and may require operator's assistance.
- **Programmatic** – Test requirements, schedules, and development standards.
- **Special** – Requirements related to hardware/software procurements.

Following each requirement, in square brackets, is the AD-1 paragraph number to which the requirement traces back.

3.1 Functional Requirements

3.1.1 Data Receipt

IPS-3.1.1-10

Demo

The IPS shall receive the Metop satellite Global Data Stream (GDS), as virtual channel data units (VCDUs) from EUMETSAT or from Fairbanks (in contingency mode), via the Communications Element in pipeline mode. [PIPS-3.3.3.1-010]

IPS-3.1.1-20

Demo

The IPS shall receive NOAA blind orbit GAC orbital data sets from the communications element, in pipeline mode. [PIPS-3.3.3.1-020]

IPS-3.1.1-30

Demo

The IPS shall receive Metop satellite instrument auxiliary data from the EPS ground segment, using Generic File Transfer (GFT) protocol (AD-1). (This includes calibration parameters, ephemeris, and clock correction information.) [PIPS-3.3.3.2-030, PIPS-3.3.3.3-020]

IPS-3.1.1-40

Demo

The IPS shall receive selected instrument data, and associated housekeeping telemetry data, extracted from the CCSDS VCDU Metop HRPT (MHRPT) data. [PIPS-3.3.3.1-010, PIPS-3.3.3.1-060]

IPS-3.1.1-50

Demo

The IPS shall be able to receive a subset of instrument data from the Metop-1 satellite and the remaining instrument data from the Metop-2 satellite when supporting Metop split mission contingency operations (see METOP Split Mission). (tbd-1) [PIPS-3.3.3.2-020]

IPS-3.1.1-60

Demo

The IPS shall be able to retrieve Common Instruments data from GDS or blind orbit data from GAC stored on backlog tapes. [PIPS-3.3.3.2-020]

IPS-3.1.1-70

Demo

The IPS shall receive the blind Stored Advanced Microwave Sounding Unit (AMSU) Information Processor (SAIP) data or the blind Stored Television Infrared Observation Satellite (TIROS) Information Processor (STIP) data from, from EPS via the communications element in pipeline mode, to support NOAA's contingency needs. (tbd-2). [PIPS-3.3.3.2-020]

IPS-3.1.1-80

Demo

The IPS shall receive the, Metop unique, instrument Level 1 products, acquired from EPS. [PIPS-3.3.3.1-100]

3.1.2 Ingest

IPS-3.1.2-10

Demo

The IPS shall ingest, and store an orbit of the Metop satellite GDS, and filter out non-common instruments by virtual channel data unit ID's (VCID), and produce Level 1a data sets, in pipeline mode. [PIPS-3.3.3.1-040]

IPS-3.1.2-20

Demo

The IPS shall ingest NOAA blind orbit GAC data sets, in pipeline mode. [PIPS-3.3.3.1-050]

IPS-3.1.2-30

Demo

The IPS shall ingest selected instrument data, and associated housekeeping telemetry data, extracted from the MHRPT data. [PIPS-3.3.3.1-060]

IPS-3.1.2-40

Demo

The IPS shall ingest a subset of instrument data from the Metop-1 satellite and the remaining instrument data from the Metop-2 satellite, when supporting Metop split mission contingency operations. (see METOP Split Mission). (tbd-1) [PIPS-3.3.3.2-020]

IPS-3.1.2-50

Demo

The IPS shall ingest backlog data (both GAC and GDS) to produce Common Instruments Level 1a data sets. [PIPS-3.3.3.2-020]

IPS-3.1.2-60

Demo

The IPS shall ingest the STIP and/or SAIP in pipeline mode to support NOAA's contingency needs. (tbd-2). [PIPS-3.3.3.2-020]

3.1.3 Preprocess

IPS-3.1.3-10

Demo

The IPS shall produce Level 1b* and 1b data sets for the AVHRR (both GAC and FRAC), AMSU-A, HIRS, MHS, A-DCS and SEM instruments aboard Metop-1 and Metop-2 satellites using auxiliary data acquired from EUMETSAT, in pipeline mode. [PIPS-3.3.3.1-070]

IPS-3.1.3-20

Demo

The IPS shall produce any selected instrument Level 1b* & 1b from the MHRPT (tbc-1) data set. [PIPS-3.3.3.1-090]

IPS-3.1.3-30

Demo

The IPS shall produce Level 1b* and 1b data sets from NOAA blind orbit GAC/SAIP/STIP orbital data sets, in pipeline mode. [PIPS-3.3.3.1-080]

3.1.4 Data Distribution

IPS-3.1.4-10

Demo

The IPS shall make available the Level 1b* data sets for the Common Instruments for the Product Generation and Distribution (PGD) system in pipeline mode. [PIPS-3.3.3.1-051]

IPS-3.1.4-20

Demo

The IPS shall make available the auxiliary data and Level 1 data sets produced or received by the IPS, for the Data Archive and Access System (AAS). [PIPS-3.3.3.1-051]

IPS-3.1.4-30

Demo

The IPS shall make available the Level 1 products from the EUMETSAT instruments (ASCAT, GOME, GRAS, and IASI) for the PGD system. [PIPS-3.3.3.1-051]

IPS-3.1.4-40

Demo

The IPS shall make available for the EPS ground segment, the auxiliary data that is used to calibrate the instruments that are on-board NOAA-N and -N' and to earth locate their measurements, using GFT protocol. (This includes calibration parameters, ephemeris (4-line elements) (tbc-3), and clock correction information (tbc-4).) [PIPS-3.3.3.2-030]

IPS-3.1.4-50

Demo

The IPS shall maintain instrument calibration databases (for both NOAA and Metop instrument data) in support of the PGD system in IPD. [PIPS-3.3.3.1-055]

IPS-3.1.4-60

Demo

The IPS shall make available the SARR, DCS and SEM Level 1 data sets, generated from the Metop global data, to the appropriate external users. [PIPS-3.3.3.2-040]

3.2 Performance Requirements

3.2.1 Ingest

IPS-3.2.1-10

Demo

The IPS shall ingest the COMMON_INSTRUMENTS data from backlog data, received on tape, so it will not impede normal near-real time operations. [PIPS-3.3.3.2-020]

3.2.2 Preprocess

IPS-3.2.2-10

Demo

The IPS shall generate Level 1b* and 1b COMMON_INSTRUMENTS level data sets, from both IJPS era satellite suites (NOAA & Metop) as to provide granules within two minutes and orbital files in three minutes, after ingest, to the PGD. [PIPS-3.3.3.4-010, PIPS-3.3.3.4-020 and PIPS-3.3.3.4-030]

IPS-3.2.2-20

Demo

The IPS shall generate Level 1b data sets from the COMMON_INSTRUMENTS data from backlog data, so it will not impede normal near-real time operations. [PIPS-3.3.3.2-020]

3.2.3 Store

IPS-3.2.3-10

Demo

The IPS shall retain the Level 1b data sets generated from the Common Instruments, as orbital files, for at least 24 hours, during the IJPS era. [PIPS-3.3.3.4-040 and PIPS-3.3.3.4-050]

3.3 Operational Requirements

3.3.1 Ingest

IPS-3.3.1-10

Demo

The IPS ingestors shall be ready for operations in order to support the IJPS PM Mission and the IJPS AM Mission, prior to the launching of NOAA-N and Metop-1, respectively.
[PIPS-3.3.3.2-010]

3.3.2 Preprocess

IPS-3.3.2-10

Demo

The IPS Level 1 preprocessors shall be ready for operations in order to support the IJPS PM Mission and the IJPS AM Mission, prior to the launching of NOAA-N and Metop-1, respectively. [PIPS-3.3.3.2-010]

3.4 Programmatic Requirements

3.4.1 Ingest

IPS-3.4.1-10

Demo

The IPS ingestors shall support the NOAA POES Ground Segment Verification and Validation (V&V) for IJPS. [PIPS-Section-4]

IPS-3.4.1-20

Demo

The IPS ingestors shall support the IJPS Joint System End-to-End V&V. [PIPS-3.3.3.2-010]

3.4.2 Preprocess

IPS-3.4.2-10

Demo

The IPS preprocessors shall support the NOAA POES Ground Segment Verification and Validation (V&V) for IJPS. [PIPS-Section-4]

IPS-3.4.2-20

Demo

The IPS preprocessors shall support the IJPS Joint System End-to-End V&V. [PIPS-3.3.3.2-010]

3.5 Special Requirements

IPS-3.5.1

Demo

IPD shall procure the hardware and software necessary to support the IPS portion of the IJPS Mission. [Derived Requirement]

IPS-3.5.2

IPD shall communicate all planning and coordination data needs (ex., requests for re-transmission of data) with the SOCC. [PIPS-3.3.3.3-010]

4.0 Keywords with Definitions

Blind Orbit GAC – A GAC orbital data set that could not be downloaded to either of NOAA's CDAs (Fairbanks or Wallops) at the time that the orbit was completed, but which is made available to NOAA by other means. In the IJPS era, BLIND_ORBIT_GAC will be downloaded by EUMETSAT and provided to NOAA in pipeline mode.

Common Instruments – The HIRS, AMSU-A, MHS, AVHRR, [A-] DCS, SEM, SARR and housekeeping telemetry from both the NOAA-N & N' and Metop-1 & -2 satellites.

EUM AUX – Auxiliary data that IPS acquires from EUMETSAT that is used to calibrate the instruments that are on-board Metop-1 and -2 and to earth locate their measurements. EUM_AUX includes calibration parameters, ephemeris, and clock correction information.

IJPS AM Mission - Receive NOAA Subset of GDS and EUM AUX, and produce and distribute IJPS/NOAA AM L1 Products to IPD users.

IJPS Mission – The IJPS AM Mission and the IJPS PM Mission.

IJPS/NOAA AM L1 Products – Level 1b and 1b* data from the AVHRR (both GAC and FRAC), AMSU-A, HIRS, MHS, A-DCS, and SEM instruments aboard Metop-1 and -2.

IJPS/NOAA PM L1 Products – Level 1b & 1b* data from the AVHRR, AMSU-A, HIRS, MHS, SBUV, [A-] DCS, and SEM instruments aboard NOAA-N and -N'. This product set is the same as that produced from NOAA-16 (tbc-2), except the AMSU-B is replaced by the MHS.

IJPS PM Mission – Perform legacy PM mission of receiving and processing to Level 1b, POES data from NOAA-KLM, N & N' satellites and acquire blind orbit GAC from EUMETSAT and provide NOAA AUX to EUMETSAT.

METOP Split Mission – A contingency mission: process up to 125% of the METOP1 subset & METOP2 subset to support split mission products (tbd-1).

METOP1 Subset – Subset of instruments to be processed from the Metop-1 satellite, considered good (healthy) instrument data.

METOP2 Subset – Subset of instruments to be processed from the Metop-2 satellite, considered good (healthy) instrument data.

NOAA AUX – Auxiliary data that EUMETSAT acquires from NOAA that is used to calibrate the instruments that are on-board NOAA-N and -N' and to earth locate their measurements. NOAA AUX includes calibration parameters, ephemeris (4-line elements) (tbc-3), and clock correction information (tbc-4).

NOAA Subset of GDS – The set of packets in the GDS data stream that are required to process the data from the NOAA instruments: HIRS, AMSU-A, MHS, AVHRR, DCS, SEM, SAR and housekeeping.

Pipeline mode – A processing mode that compensates for limited communication bandwidth. It pertains to a chain of processors that are applied in sequence to orbital data. In pipeline mode, at any given moment, each of the processors works on a different piece (referred to as a granule) of the orbital data set, typically on the granule that was just completed by the preceding processor in the sequence.

Split Mission Products – Products made from some instruments from Metop-1 (minus a faulty instrument) and the remaining products made with the healthy instrument(s) from Metop-2 in a very close orbit.

5.0 Open Issues

5.1 TBC

tbc-1 Must confirm if the AVHRR instrument is the only instrument product required to be produced from the MHRPT.

tbc-2 Must confirm that there is no difference between IJPS/NOAA PM L1 Products and the product set produced from NOAA-16 data.

tbc-3 Must confirm if IPD is to supply the 4-line element or if EUMETSAT can get it from the same supplier(s) used by IPD.

tbc-4 Must confirm if IPD is to supply the clock correction or if SOCC will supply it to EUMETSAT.

5.2 TBD

tbd-1 The Metop split mission scenario might be implemented if a major instrument on-board Metop-1 failed. In that case, Metop-2 would be launched in a very close orbit to Metop-1. Under normal circumstances, Metop-2 would be the operational satellite. If, however, a different instrument on-board Metop-2 failed, the split mission scenario could be implemented, and NOAA would receive up to 125% of the data, most from the operational satellite, except data from the failed instrument; data from that instrument would be acquired from the other satellite.

tbd-2 Although processing of SAIP & STIP will be the same, the priority of processing with operational data (timeliness) and the resources needed to process in parallel need to be known.

Appendix A. Requirements Matrix

Requirement ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Method	Comments
	3.1 Functional Requirements	From AD-1			
IPS-3.1.1-10	Receive the set of packets in the GDS data stream that are required to process the data from the common (NOAA-N, N' & Metop-1, -2) instruments.	PIPS-3.3.3.1-010		DEMO	
IPS-3.1.1-20	The IPS shall receive NOAA blind orbit GAC orbital data sets from the communications element in pipeline mode.	PIPS- 3.3.3.1-020		DEMO	The IPS requirement as stated, satisfies these two AD-1 requirements.
IPS-3.1.1-30	The IPS shall receive Metop satellite instrument auxiliary data from the EPS ground segment, using Generic File Transfer (GFT) protocol (AD-1). (This includes calibration parameters, ephemeris, and clock correction information.)	PIPS-3.3.3.2-030 PIPS-3.3.3.3-020		DEMO	
IPS-3.1.1-40	The IPS shall receive the Metop AVHRR instrument data and associated housekeeping telemetry data, extracted from the MetOp MHRPT data, in pipeline mode.	PIPS-3.3.3.1-010 PIPS-3.3.3.1-060		DEMO	
IPS-3.1.1-50	The IPS shall receive a subset of instruments from the Metop-1 satellite, considered good (healthy) instrument data and the remaining instruments from the Metop-2 satellite contingency data.	PIPS-3.3.3.2-020		DEMO	
IPS-3.1.1-60	The IPS shall retrieve common instrument data from GDS or blind orbit data from GAC stored on backlog tapes.	PIPS-3.3.3.2-020		DEMO	
IPS-3.1.1-70	The IPS shall receive the STIP and/or SAIP from the communications element in pipeline mode, to support NOAA's contingency needs.	PIPS-3.3.3.2-020		DEMO	
IPS-3.1.1-80	The IPS shall receive the Metop instrument Level 1 and possibly Level 2 products, acquired from EPS.	PIPS-3.3.3.1-100			
IPS-3.1.2-10	The IPS shall ingest and store an orbit of the Metop satellite GDS, and filter out non-common instruments by virtual channel data unit ID's (VCID), and produce Level 1a data sets, in pipeline mode.	PIPS-3.3.3.1-040		DEMO	
IPS-3.1.2-20	The IPS shall ingest NOAA blind orbit GAC data sets, in pipeline mode.	PIPS-3.3.3.1-050		DEMO	

Requirement ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Method	Comments
IPS-3.1.2-30	The IPS shall ingest the Metop AVHRR instrument data and associated housekeeping telemetry data, extracted from the MetOp MHRPT data, in pipeline mode.	PIPS-3.3.3.1-060		DEMO	
IPS-3.1.2-40	The IPS shall ingest a subset of instruments from the Metop-1 satellite, considered good (healthy) instrument data and the remaining instruments from the Metop-2 satellite contingency data.	PIPS-3.3.3.2-020		DEMO	
IPS-3.1.2-50	The IPS shall ingest backlog data to produce common instrument Level 1a data sets.	PIPS-3.3.3.2-020		DEMO	
IPS-3.1.2-60	The IPS shall ingest the STIP and/or SAIP in pipeline mode to support NOAA's contingency needs.	PIPS-3.3.3.2-020		DEMO	
IPS-3.1.3-10	The IPS shall produce Level 1b* and 1b data sets for the AVHRR (both GAC and FRAC), AMSU-A, HIRS, MHS, A-DCS and SEM instruments aboard Metop-1 and Metop-2 satellites using auxiliary data acquired from EUMETSAT, in pipeline mode.	PIPS-3.3.3.1-070		DEMO	
IPS-3.1.3-20	The IPS shall produce full and reduced resolution AVHRR Level 1b* & 1b from the MHRPT (tbc-1) product set.	PIPS-3.3.3.1-090		DEMO	
IPS-3.1.3-30	The IPS shall produce Level 1b* and 1b data sets from NOAA blind orbit GAC orbital data sets, in pipeline mode.	PIPS-3.3.3.1-080		DEMO	
IPS-3.1.4-10	The IPS shall make available the Level 1b* data sets for the common instruments, for the Product Generation and Distribution (PGD) system in pipeline mode.	PIPS-3.3.3.1-051		DEMO	
IPS-3.1.4-20	The IPS shall make available the auxiliary data and Level 1 data sets produced or received by the IPS, for the Data Archive and Access System (AAS).	PIPS-3.3.3.1-051		DEMO	
IPS-3.1.4-30	The IPS shall make available the Level 1 products from the EUMETSAT instruments (ASCAT, GOME, GRAS, and IASI) for the Product Generation and Distribution (PGD) system.	PIPS-3.3.3.1-051		DEMO	

Requirement ID	Requirement Statement	Source Requirement	Allocated Requirements	Verification Method	Comments
IPS-3.1.4-40	The IPS shall make available for the EPS ground segment, the auxiliary data that is used to calibrate the instruments that are on-board NOAA-N and -N' and to earth locate their measurements, via the Internet, using GFT protocol. (This includes calibration parameters, ephemeris (4-line elements) (tbc-3), and clock correction information (tbc-4).)	PIPS-3.3.3.2-030		DEMO	
IPS-3.1.4-50	The IPS shall maintain instrument calibration databases (for both NOAA and Metop instrument data) in support of the Product Generation and Distribution (PGD) system in IPD.	PIPS-3.3.3.1-055		DEMO	
IPS-3.1.4-60	The IPS shall make available the SARR and SEM Level 1 data, generated from the Metop global data sets, to the appropriate IPD users.	PIPS-3.3.3.2-040		DEMO	
	3.2 Performance Requirements	From AD-1			
IPS-3.2.1-10	The IPS shall ingest the common instruments from backlog data, received on tape, so it will not impede normal near-real time operations.	PIPS-3.3.3.2-020	IPS-3.5.1 IPS-3.5.2	DEMO	
IPS-3.2.2-10	The IPS shall generate Level 1b* and 1b instrument level data sets, from both IJPS era satellite suites as to provide, at least granules, to the PGD to meet their 180 minute timeliness requirement.	PIPS-3.3.3.4-010 PIPS-3.3.3.4-020 PIPS-3.3.3.4-030		DEMO	The IPS requirement as stated, satisfies these three AD-1 requirements.
IPS-3.2.2-20	The IPS shall generate Level 1b data sets from the common instruments from backlog data, so it will not impede normal near-real time operations.	PIPS-3.3.3.2-020		DEMO	
IPS-3.2.3-10	The IPS shall retain Level 1b data sets, as orbital files, for at least 24 hours, during the IJPS era.	PIPS-3.3.3.4-040 PIPS-3.3.3.4-050		DEMO	
	3.3 Operational Requirements	From AD-1			
IPS-3.3.1-10	The IPS ingestors shall be ready for operations in order to support the IJPS_AM_MISSION and the IJPS_PM_MISSION prior to the launching of NOAA-N and Metop-1.	PIPS-3.3.3.2-010	IPS-3.4.1-10 IPS-3.4.1-20 IPS-3.4.2-10 IPS-3.4.2-20	DEMO	
IPS-3.3.2-10	The IPS Level 1 preprocessors shall be ready for operations in order to support the IJPS_AM_MISSION and the IJPS_PM_MISSION prior to the launching of NOAA-N and Metop-1.	PIPS-3.3.3.2-010	IPS-3.4.1-10 IPS-3.4.1-20 IPS-3.4.2-10 IPS-3.4.2-20	DEMO	

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